



# LOAD BANK, ELECTRICAL, 100 kW

FOR OFFICIAL U.S. GOVERNMENT ONLY. USE ONLY WITH GOVERNMENT EQUIPMENT.

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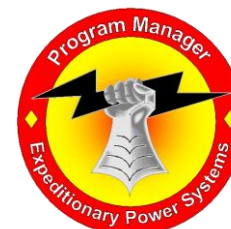
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# INTRODUCTION



This Job Aid provides basic operating instructions for the Load Bank, Electrical, 100kW. It includes a description and procedures to employ the Load Bank.

Use this Job Aid as a quick reference guide to assist you in operating the Load Bank or training other personnel in its use.

## **NOTICE TO USER**

This Job Aid does not replace the Operations/Maintenance Technical Manual (TM 07500C-OI). Refer to the technical manual for additional operating, troubleshooting procedures, maintenance instructions and safety precautions.



# DESCRIPTION

The Avtron Model LSH100D42423 Load Bank is an outdoor unit designed to apply a balanced 3-phase resistive load, at 120/208 or 240/416 VAC at 50, 60 or 400 Hz.

The total load capability is 100kW and load steps are 1, 2, 2, 5, 5, 10, 25, and 50kW. Any combination of load steps may be selected to achieve a desired load.

The Load Bank contains a blower with a single-phase Blower Motor requiring 120/240 VAC, 50/60 Hz to provide the necessary cooling air for the resistive elements.



# EQUIPMENT DATA

NSN.....6150-01-557-1304

ID Number.....07500C

TAMCN.....B0579

Model Number.....LSH100D42423-1 (GREEN)  
LSH100D42423-2 (TAN)



The Load Bank has two different model numbers to identify the different colors. The tan systems were ordered for the operating forces and the green / tan for MPS. If a unit increases their TE allowance, they will receive a tan model.



# **GENERAL SAFETY PRECAUTIONS**

## **KEEP AWAY FROM LIVE CIRCUITS**

Operating personnel must at all times observe all safety regulations. Do not replace components or make adjustments inside the equipment with the voltage supply turned on. Under certain conditions, dangerous potentials may exist when the power control is in the OFF position. To avoid casualties, always remove power and discharge.

## **GROUND A CIRCUIT BEFORE TOUCHING IT.**

## **DO NOT SERVICE OR ADJUST ALONE.**

Under no circumstances should any person reach into or enter the enclosure for the purpose of servicing or adjusting the equipment except in the presence of someone who is capable of rendering aid.

## **RESUSCITATION**

Personnel working with or near high voltages should be familiar with modern methods of resuscitation. Such information may be obtained from the Bureau of Medicine and Surgery.

# GROUNDING

Securely ground the Load Bank with either a ground rod or an established ground. The Load Bank and the Generator under test are to share the same physical earth ground point. Connect the Load Bank and the Generator to the same ground rod.



Load Bank Ground wire →

Generator Ground wire →





# COMPONENTS

Interconnect Cable Set PN B31396, NSN 6152-01-570-4708, is to be used when connecting PHASE conductors for testing 21kW to 100kW Generators (454 amp maximum). The size of these cables are 4/O AWG.



Black



Red



Blue



White

# COMPONENTS

Interconnect Cable Set PN B31397, NSN 6150-01-570-3818, is to be used when connecting PHASE conductors for testing 5kW to 30kW Generators (118 amp maximum). The size of these cables are 6 AWG.



Black



Red



Blue



White

# COMPONENTS

Interconnect Cable Ground PN B31398, NSN 6145-01-570-9583, is to be used to connect the Load Bank enclosure to the Generator ground rod kit. The size of this cable is 2 AWG.



Green

# COMPONENTS

A 25 foot external power cord is installed on the Load Bank. The external power cord connects to a 20 amp, 50/60 Hz, 120 VAC power supply to power the Load Bank control and blower circuits for testing 400 Hz Generators.



# CONTROLS AND INDICATORS



DESIGNATOR	CONTROL / INSTRUMENT	PURPOSE / USE
M1	Multifunction LED Display	Displays levels of Voltage, Current, kW etc.

# CONTROLS AND INDICATORS



**DS1**

**DS2**

**DS3**

**DS4**

**DS5**

**DS6**

DESIGNATOR	CONTROL / INSTRUMENT	PURPOSE / USE
DS1	Control Power Lamp	Lamp Control Power, Green
DS2	Air Failure Lamp	Lamp Air Failure, Red
DS3	Blower Power Lamp	Lamp Blower Power, Amber
DS4	Phase "A " Indicator Lamp	Lamp Phase A Input, Green
DS5	Phase "B" Indicator Lamp	Lamp Phase B Input, Green
DS6	Phase "C" Indicator Lamp	Lamp Phase C Input, Green

# CONTROLS AND INDICATORS



**S18**

**S19**

**S101**

**S102**

DESIGNATOR	CONTROL / INSTRUMENT	PURPOSE / USE
S18	Control Power Select Switch	Selects an Internal or External source of control power
S19	External Control Power On / Off Switch	Turns the External power On / Off
S100	Internal Transformer "ON" Switch	Energizes the Internal Transformer
S101	Internal Transformer "OFF" Switch	De-energizes the Internal Transformer
S102	Internal Transformer Voltage Configuration Switch	Selects the Internal Transformer Voltage Configuration



# CONTROLS AND INDICATORS



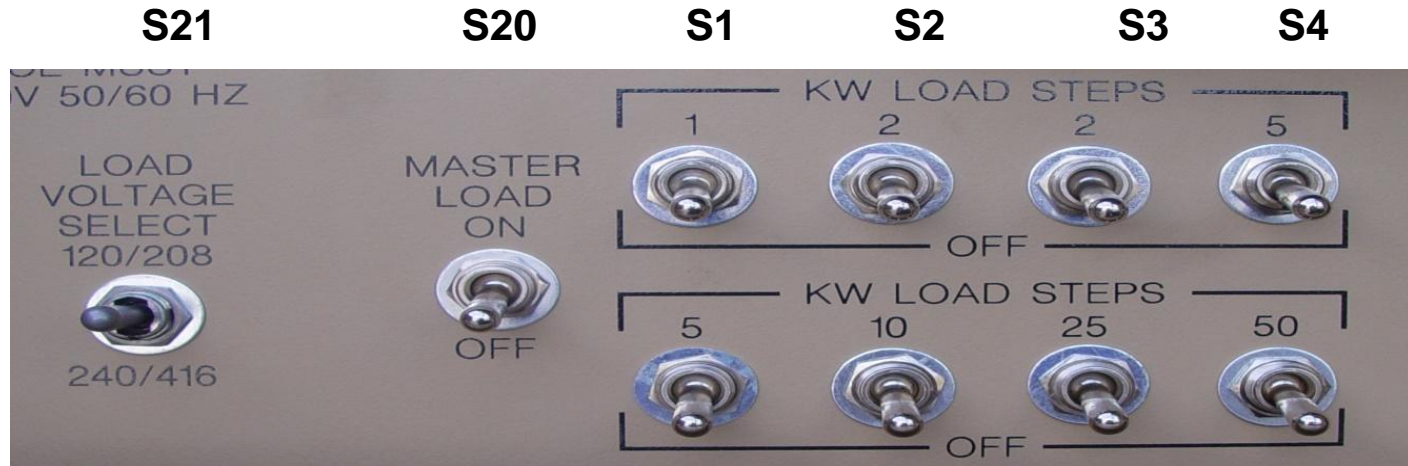
**S22**

**S23**

**S17**

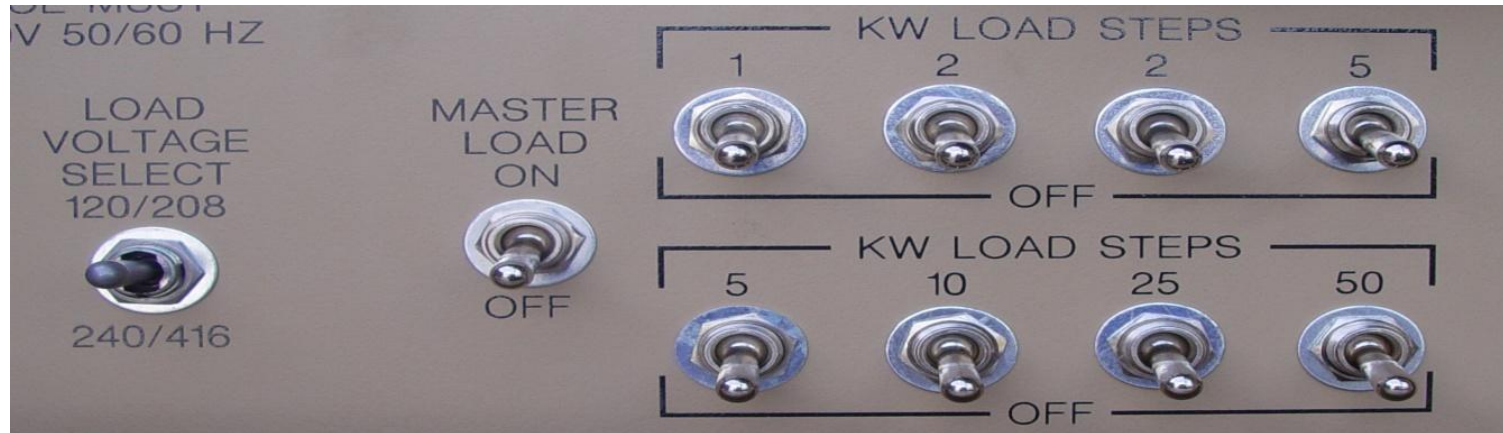
DESIGNATOR	CONTROL / INSTRUMENT	PURPOSE / USE
S22	Blower Start Switch (Black)	Energizes the blower circuits
S23	Blower Stop Switch (Red)	De-energizes the blower circuits
S17	Blower Voltage Select Switch	Set to match the Generator voltage configuration or external power

# CONTROLS AND INDICATORS



DESIGNATOR	CONTROL / INSTRUMENT	PURPOSE / USE
S21	Load Voltage Select Switch	Set to match the Generator voltage configuration
S20	Master Load Switch	Activates and controls load step switches
S1	1 kW Toggle Switch	Applies 1kW load to phase A, B and C
S2	2 kW Toggle Switch	Applies 2kW load to phase A, B and C
S3	2 kW Toggle Switch	Applies 2kW load to phase A, B and C
S4	5 kW Toggle Switch	Applies 5kW load to phase A, B and C

# CONTROLS AND INDICATORS



**S5**

**S6**

**S7**

**S8**

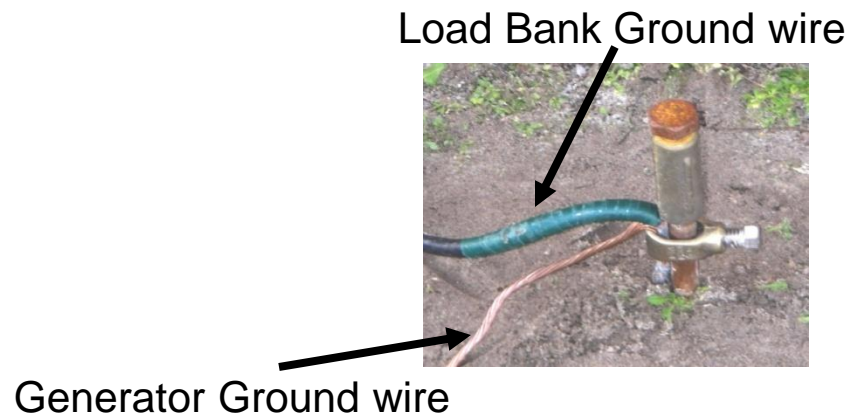
DESIGNATOR	CONTROL / INSTRUMENT	PURPOSE / USE
S5	5 kW Toggle Switch	Applies 5kW load to phase A, B and C
S6	10 kW Toggle Switch	Applies 10kW load to phase A, B and C
S7	25 kW Toggle Switch	Applies 25kW load to phase A, B and C
S8	50 kW Toggle Switch	Applies 50kW load to phase A, B and C

# **OPERATION IN UNUSUAL CONDITIONS**

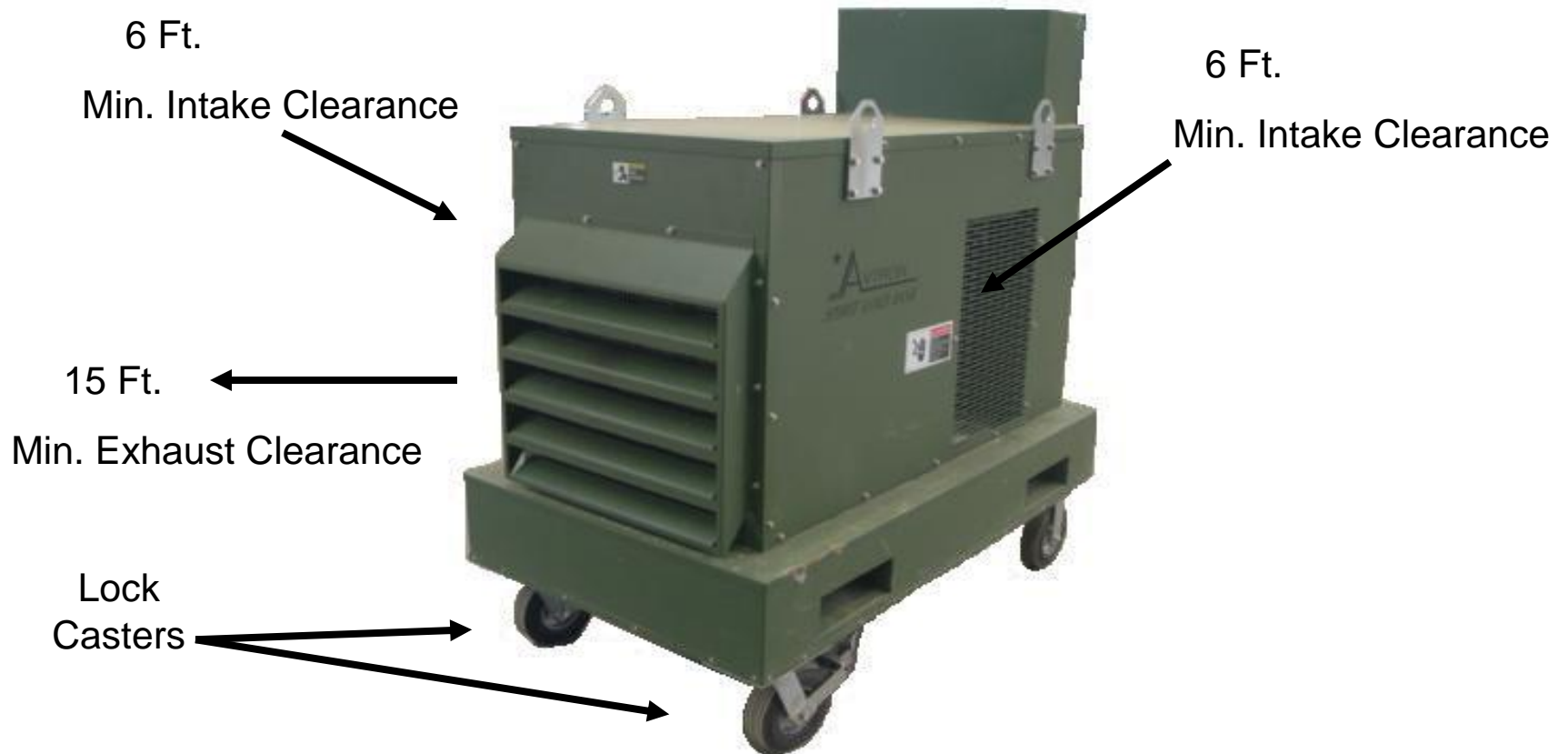
1. The Load Bank is designed to operate in ambient temperatures between -25°F and 131°F.
2. The Load Bank will operate satisfactorily after storage in ambient temperatures between -40°F and 160°F.
3. The Load Bank must be allowed to acclimate to within its rated ambient temperature range of -25°F and 131°F prior to operation.
4. After periods of storage in cold environments below -25°F, the Load Bank control circuitry must be energized for a minimum of 15 minutes prior to operation, to warm the control circuitry.
5. When operating the Load Bank in windy conditions, position the Load Bank so the exhaust does not blow against the prevailing wind.
6. When operating the Load Bank above 4,000 feet, refer to the applicable Generator TM for the Generator derate percentage.

# SETUP AND INSTALLATION

- Step 1. Provide adequate ventilation and unrestricted air flow around units. Minimum of six feet intake and fifteen feet exhaust.
- Step 2. Ensure that the air intake and exhaust areas are not blocked.
- Step 3. Ensure the rear wheel casters are locked.
- Step 4. Securely ground the Load Bank to an established ground. The Load Bank and the Generator are to share the same physical earth ground point.

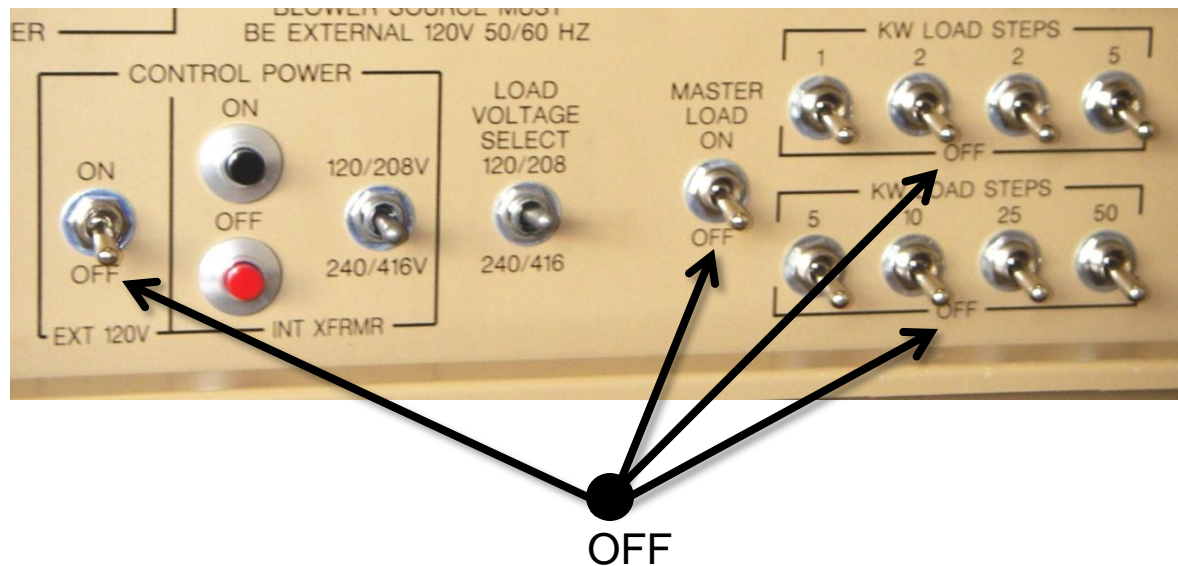


# SETUP/INSTALLATION



# SETUP/INSTALLATION

Step 5. Place the EXT 120V, Master Load, and all Load Step Switches to the OFF position.



### Step 6. Connect the Generator to be tested to the Load Bank.



# SETUP/INSTALLATION

## WARNING

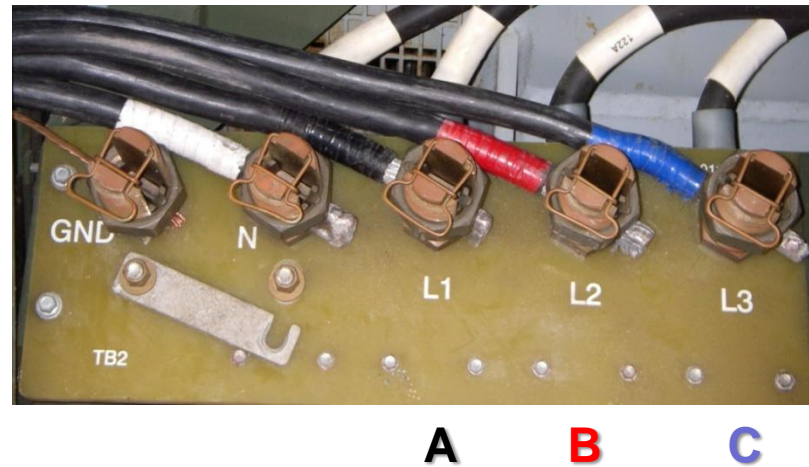
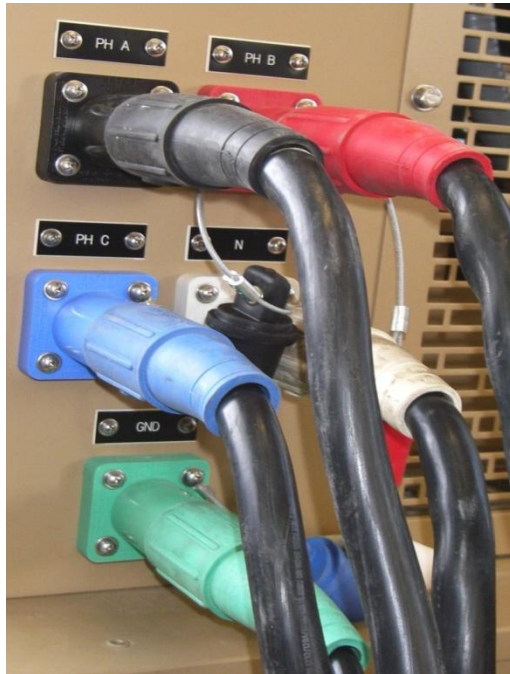
**BE SURE THAT THE GENERATOR IS DE-ENERGIZED BEFORE CONNECTIONS ARE MADE AND USE INTERCONNECTING CABLE ADEQUATELY RATED FOR THE LOAD.**

Step 7. Connect the Cam Lock connectors according to the following table and the illustrations on page 22 and 23.

GENERATOR	LOAD BANK	
L1 or Phase A	PH A	Black
L2 or Phase B	PH B	Red
L3 or Phase C	PH C	Blue
L0 or Neutral	N	White
Ground	Ground	Green

Step 8. Ensure the Cam Lock connectors are fully secured to the Load Bank. They must be rotated 180° clockwise to lock. Locked correctly, the connector sleeve set screws will be at the 6 o'clock position.

# SETUP/INSTALLATION



## WARNING

**DO NOT USE CABLING WITH LOOSE OR FRAYED STRANDS.**

# BEFORE OPERATION

- Step 1. Inspect the Load Bank set for any internal or external damage.
- Step 2. Open the connection box enclosure door. Inspect all cables and wires for damage, looseness or corrosion.
- Step 3. Verify all fuses and relays are installed.
- Step 4. Close CB1.

CB1



# BEFORE OPERATION

Step 5. Close and secure the connection box enclosure door.

Step 6. Check the control panel for damage.

Step 7. Check air intake and exhaust grills for any obstructions.

Step 8. Inspect input cables for defective insulation and secure connections.



Cable Set B31396, 454 AMPS



Cable Set B31397, 118 AMPS

## BEFORE OPERATION

- Step 9. Ensure that cables are correctly connected to the Generator.
- Step 10. Ensure that you understand the current rating of the Generator under test and the correct interconnect cable set is connected. Refer to the Generator's Technical Manual.
- Step 11. If testing a 400 Hz Generator, plug in the External Power Cord. The External Power Cord must be used to power the control and blower circuits.

### NOTE

The External Power Cord must be plugged into a source capable of providing 20 amps 120 VAC 50/60 Hz.



External Power Cord



**Danger**  
**of death**

## **120/208VAC 50/60 Hz INTERNAL POWER OPERATION**

- Step 1. Place the CONTROL POWER SELECT Switch to the INTERNAL position.
- Step 2. Set the INT XFRMR Switch to 120/208V position.
- Step 3. Place the BLOWER VOLTAGE SELECT switch to the INT 208 position.
- Step 4. Start the Generator under test and allow the Generator to reach operational temperature, then close the Generator Load Contactor. Load Bank indicator LEDS (DS4 - DS6) PHASE A, PHASE B, PHASE C will illuminate.
- Step 5. Press the CONTROL POWER ON pushbutton. Indicator LED (DS1) CONTROL POWER and M1 Digital Meter will illuminate.
- Step 6. Allow the Digital Meter to run a self test.



# **120/208VAC 50/60 Hz**

## **INTERNAL POWER OPERATION**

Step 7. Press the BLOWER POWER START pushbutton switch. The BLOWER POWER LED (DS3) will illuminate.

### **NOTE**

The AIR FAILURE LED (DS2) will flash on momentarily.

### **CAUTION**

**The operation of the blower is vital to the safe operation of this Load Bank. When the blower is turned ON, the AIR FAILURE LED will come on momentarily until the blower accelerates up to its operating speed, at which time the LED will go off. If the air switch prevents the load from being applied (AIR FAILURE indicator LED on), do not bypass the air switch. This will cause the Load Bank to burn up. Do not attempt to operate the unit until the problem is corrected. Refer to operators troubleshooting procedures in Table 3-4, for Air Failure LED.**

## **120/208VAC 50/60 Hz INTERNAL POWER OPERATION**

Step 8. Place the LOAD VOLTAGE SELECT Switch in the 120/208 position.

Step 9. Place the MASTER LOAD switch to the ON position.

Step 10. Use the up or down arrow keys to set the Digital Meter to display current on each phase.

Step 11. Using the LOAD STEP toggle switches, turn on one toggle switch at a time until the desired load for testing has been obtained.

### **CAUTION**

**Observe the Digital Meter to ensure you do not exceed the current rating of the Generator under test or the interconnect cable set. Failure to observe this caution may cause damage to the equipment.**

## **240/416VAC 50/60 Hz INTERNAL POWER OPERATION**

- Step 1. Place the CONTROL POWER SELECT Switch to the INTERNAL position.
- Step 2. Set the INT XFRMR Switch to 240/416V position.
- Step 3. Place the BLOWER VOLTAGE SELECT switch to the INT 416 position.
- Step 4. Start the Generator under test, and allow the Generator to reach operational temperature, close the Generator Load Contactor. Indicator LEDS (DS4-DS6) PHASE A, PHASE B, PHASE C will illuminate.
- Step 5. Press the CONTROL POWER ON pushbutton. Indicator LED (DS1) CONTROL POWER and M1 Digital Meter will illuminate.
- Step 6. Allow the Digital Meter to run a self test.

## **240/416VAC 50/60 Hz**

### **INTERNAL POWER OPERATION**

Step 7. Press the BLOWER POWER START pushbutton switch. The BLOWER POWER LED (DS3) will illuminate.

#### **NOTE**

The AIR FAILURE LED (DS2) will flash on momentarily.

#### **CAUTION**

**The operation of the blower is vital to the safe operation of this Load Bank. When the blower is turned ON, the AIR FAILURE LED will come on momentarily until the blower accelerates up to its operating speed, at which time the LED will go off. If the air switch prevents the load from being applied (AIR FAILURE indicator LED on), do not bypass the air switch. This will cause the Load Bank to burn up. Do not attempt to operate the unit until the problem is corrected. Refer to operators troubleshooting procedures in Table 3-4, for Air Failure LED.**

## **240/416VAC 50/60 Hz INTERNAL POWER OPERATION**

Step 8. Place the LOAD VOLTAGE SELECT Switch in the 240/416 position.

Step 9. Place the MASTER LOAD switch to the ON position.

Step 10. Use the up or down arrow keys to set the Digital Meter to display current on each phase.

Step 11. Using the LOAD STEP toggle switches, turn on one toggle switch at a time until the desired load for testing has been obtained.

### **CAUTION**

**Observe the Digital Meter to ensure you do not exceed the current rating of the Generator under test or the interconnect cable set. Failure to observe this caution may cause damage to the equipment.**

# **120/208VAC, 240/416VAC 400 Hz EXTERNAL POWER OPERATION**

## **CAUTION**

**DO NOT operate the Load Bank from the Generator INTERNAL voltage source when testing Generators at 400 Hz. For 400 Hz testing, CONTROL and BLOWER POWER must be EXTERNAL. Use the External Power Cord provided with the Load Bank.**

## **NOTE**

The External Power Cord must be plugged into a source capable of providing 20 Amps 120 VAC 50/60 Hz.

## **120/208VAC, 240/416VAC 400 Hz EXTERNAL POWER OPERATION**

- Step 1. Place the CONTROL POWER SELECT Switch to the EXTERNAL position.
- Step 2. Place the BLOWER VOLTAGE SELECT switch to the EXT 120 position.
- Step 3. Start the Generator under test, allow the Generator to reach operational temperature, close the Generator Load Contactor. Load Bank indicator LEDS (DS4-DS6) PHASE A, PHASE B, PHASE C will illuminate.
- Step 4. Set the CONTROL POWER Switch EXT 120V to the ON position. Indicator LED (DS1) CONTROL POWER and M1 Digital Meter will illuminate.
- Step 5. Allow the Digital Meter to run a self test.



## **120/208VAC, 240/416VAC 400 Hz EXTERNAL POWER OPERATION**

Step 6. Press the BLOWER POWER START pushbutton switch. The BLOWER POWER LED (DS3) will illuminate.

### **NOTE**

The AIR FAILURE LED (DS2) will flash on momentarily.

### **CAUTION**

**The operation of the blower is vital to the safe operation of this Load Bank. When the blower is turned ON, the AIR FAILURE LED will come on momentarily until the blower accelerates up to its operating speed, at which time the LED will go off. If the air switch prevents the load from being applied (AIR FAILURE indicator LED on), do not bypass the air switch. This will cause the Load Bank to burn up. Do not attempt to operate the unit until the problem is corrected. Refer to operators troubleshooting procedures in Table 3-4, for Air Failure LED.**

## **120/208VAC, 240/416VAC 400 Hz EXTERNAL POWER OPERATION**

Step 7. Place the LOAD VOLTAGE SELECT Switch in the 120/208 or 240/416 position.

Step 8. Place the MASTER LOAD switch to the ON position.

Step 9. Use the up or down arrow keys to set the Digital Meter to display current on each phase.

Step 10. Using the LOAD STEP toggle switches, turn on one toggle switch at a time until the desired load for testing has been obtained.

### **CAUTION**

**Observe the Digital Meter to ensure you do not exceed the current rating of the Generator under test or the interconnect cable set. Failure to observe this caution may cause damage to the equipment.**

# **DURING OPERATION**

## **WARNING**

**DO NOT TOUCH THE EXHAUST SCREEN DURING OPERATION. THE SCREEN WILL BECOME HOT FROM THE EXHAUSTED HEAT AND MAY CAUSE A SERIOUS BURN. DO NOT ALLOW OBJECTS TO ENTER OR BLOCK THE AIR INTAKE SCREENS.**

## **WARNING**

**DO NOT OPEN THE CONNECTION BOX ENCLOSURE DOOR DURING OPERATION. LETHAL VOLTAGES ARE PRESENT. FAILURE TO OBSERVE THIS WARNING MAY RESULT IN INJURY OR DEATH BY ELECTROCUTION.**

# DURING OPERATION

Step 1. Monitor both the Digital Display Meter and the Generator under test control panel to ensure all indicators remain within operational range. Refer to the applicable Generator's Technical Manual.

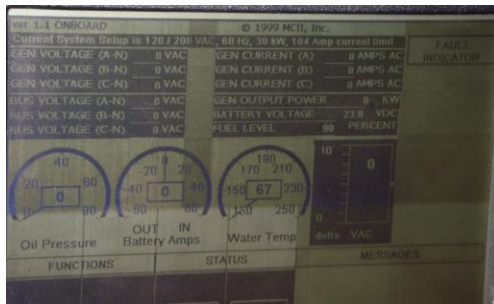
Load Bank Digital Display



TQG Alpha Series



TQG Bravo Series




MEP 807A



# SHUTDOWN

- Step 1. Decrease the applied load by turning the load step switches off one at a time.
- Step 2. Turn the MASTER LOAD SWITCH off.
- Step 3. Allow the blower to run for five minutes to cool the resistive elements.
- Step 4. Press the blower power STOP pushbutton switch.
- Step 5. Press the CONTROL POWER OFF pushbutton or place the EXTERNAL CONTROL POWER switch to the OFF position.
- Step 6. Open the Generator Load Contactor.
- Step 7. Allow the Generator to run for five minutes to cool the engine and A/C alternator.
- Step 8. Shutdown the Generator, refer to the applicable Generator's Technical Manual.



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